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ABSTRACT

Previous studies, while not suggesting that all preschool programs will bring lasting benefits, demonstrate that early education can change the course of children's lives, especially children from disadvantaged backgrounds. This study dealt with early childhood education and school success, evaluating the effect of preschool attendance on reading and mathematics achievement. The study included 65 third-grade students from a Chicago public elementary school. From the 65, 60 students were selected, half of whom had attended preschool and half of whom had not. Reading and mathematics achievement scores from the Iowa Tests of Basic Skills (ITBS), which are administered annually to Chicago public elementary students, were analyzed. Results showed that preschool education had a significant impact on mathematical achievement but not on reading achievement, indicating a need for further research on preschool attendance and academic achievement, including the effects of gender and age. (Contains 20 references.) (BGC)

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The Effectiveness of Preschool Attendance on Reading and Mathematics Achievement

Dorothy Horton

ED 400 929

Early childhood education programs were, for the most part, privately run and well adapted to the developmental needs of the children they served. All of this changed in the 1960s when early childhood education was abruptly shoved into the economic, political and social spotlight (Elkind, 1986).

Beginning in the late 1960s the number of children in preschool programs in the United States greatly increased. For a time (until the mid-1980s) this increase occurred even as the total number of children under age five was decreasing. Since 1985, however, this populatıcn has been on the rise. The percentage of children enrolled in preschool programs rose from about 27 percent in 1966 to about 56 percent in 1991. In October 1991 there were 6,334,000 children enrolled in preprimary programs..3,266,000 five- year-old, 1,993,000 four- year-old, and 1,075,000 three-year-old. This represented 86 percent of the five-year-old, 53 percent of the four-year-old, and 28.2 percent of the three-year-old. Of those enrolled in preschool programs , the majority attended for only part of the day.

Preschool programs serve a range of purposes. In general, they are designed to support the development of children during their early years. They serve to increase children's intellectual ability and language competence and to provide them with the skills of expression. They act as socializing agents, preparing children for the world of elementary school as well as participation in society at large. In many ways the preschool acts as the bridge between a child's life at home,within the family, and life in the larger community, which is first experienced in school. A number of special programs serve children whose parents work, as well as those of single-parent families and families that need additional social support to maintain themselves. Head start and similar programs, such as those supported under Title 1 of the Elementary and Secondary Act, provide education health, and social services for children from low-income families.

Project Head start (1965) brought attention to work that had been done in the 1940s at the University of Iowa Child Welfare Station and to other project that showed nursery school experience had a positive influence on the intellectual development of children. Whereas, formal schooling usually begins at age 5 (kindergarten) or age 6, educators and parents have now begun to view the earlier years of childhood as an essential part or primary education.
Styfco and Zigler (1993) reported that it has been 30 years

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since the American Economic Opportunity Act (1964) was passed as part of President Johnson's War on Poverty. One of the programmes set up as a result, was the Community Action Programme which was intended to provide local communities with resources to run their own antipoverty programmes. However, he also tells us, that some local governments opposed the placement of administrative control and resources in the hands of poor people and...refused to apply for programme grants.

Larsen and Robinson (1989) did a study to examine the effects of preschool attendance upon school achievement scores and out of school activities for 196 second and third grade children, 125 of whom had attended a university -affiliated preschool and 71 of whom were nonattenders. Males who had attended preschool scored significantly higher on the reading vocabulary, total reading, spelling, total language, and total battery components of achievement measures than did males who had not attended preschool. A preschool effect upon achievement scores for females from these age groups was not found. Contrary to assumptions that home and family experience are sufficient to enhance development and learning for low-risk children, the findings of this study seem to indicate that, for males, preschool attendance does have a significant effect on later school achievement scores, especially in language-related areas.

A study was done which consisted of achievement scores from 96 children (59 who had attended preschool and 37 preschool nonattenders) who had taken the CTBS in second grade and 100 children (66 who had attended preschool and 34 who were nonattenders) tested in third grade by means of SRA achievement battery. Eleven common component scores (reading vocabulary, reading comprehension, total reading, spelling, language mechanics, language expression, total language, math computation, math concepts, total math, and total battery) from the two achievement measures were transformed using a Normal Curve Equivalent (NCE) scale for analyses. Data analyses were conducted separately for males and females because research findings have shown a consistent gender difference on subtests of standardized achievement measures (Evans, 1970: Hieronymus & Lindquist, 1974).

The results of the data analysis for males indicated a significant group effect favoring preschool attenders, $F(,81) = 5.86$, $p=.018$ while group x test interaction was nonsignificant. Males who had attended preschool score consistently higher than male nonattenders on all components.

Separate two-way were conducted on male and female data sets to determine significant effects of group interaction. For

females,there was no significant group effect or group x test interaction. The difference between mean score across eleven test components were small and did not consistently favor preschool attenders.

Schweinhart and Weikart (1993) did a study on the Perry·Preschool and found that data from this project remains the most complete and the most impressive. At all ages, boys scored higher than girls overall. The average difference between male and female scores was virtually the same for all grades in the study. One might wonder, given the difference at grade 2, why the difference doesn't increase in later grades. Given an early advantage, one might expect to see diverging scores among older children, but this did not occur. The authors observed only that the differences are related constant in magnitude and do not formulate hypotheses about why this is so. Boys also have a larger standard deviation at all grade levels than girls.

Looking at mathematics subskills, the researcher found boys scoring better on questions involving understanding of mathematical concepts. Boys were somewhat more likely to notice when there was insufficient information present to determine an answer, and they were slightly less likely to say that there was not enough information present when in fact, there was. Although the performance of boy and girls on problems that included irrelevant information was not a major thrust of the research, findings show that gender differences have generally been more pronounced in studies of select population than in studies of the whole range of achievement.

Flynn and Rahbar (1993) summarized the effects of age and gender on third grade achievement. It concluded that the hypothesis that age of school entrance and gender interact to affect academic achievement was tested of three samples of children at the end of 1st, 2nd and 3rd grades. Analysis of age, gender and their interaction of reading achievement resulted in significant effects of age for each sample. Separate gender and analysis variance by age class revealed that girls who were 6 years or older at time of entrance achieved significantly lower than middle-entrance age or younger girls. There were no significant age class effects for boys.

Larsen and Harris (1986) conducted a study of 196 second and third grade children (190 males and 106 females) who constituted the first three of dive subjects wave included in to on-going university-sponsored longitudinal research projects. Each subject has a randomly selected experimental (attended preschool) and a control (did not attend preschool) group. The original sample for the three waves numbered 191 experimental and 100 control subjects.

In the present study there were 125 children (55 males and 70 females) who had attended preschool and 71 (35 males and 36 females) who had not attended preschool.

The application pool from which the experimental and control groups were selected averaged 300 for each wave. Applicants come from a small metropolitan area. The experimental group in each wave was comprised of those who had attended the campus preschool for a minimum of two semesters and who were eligible for kindergarten the following year. Subjects for the control groups did not attend other preschool programs in the area.

As a 32.7% attrition had occurred over the four-year time period from preschool to third grade, there was concern that such a substantial drop-out rate might have biased the sample. However, chi-square analyses revealed no significant differences in proportion of attrition for males. $X^{1}(2,n=54)=1.37,p-.503$, and females x square$(2,n49)=1.95$, $p=.377$, across group and subject wave. In addition a 2x2 (group by attrition) analysis of variance was performed using preschool IQ and social competency scores as dependent variables. Results of this analysis indicated that IQ score means were not affected by attrition, and that there was no significant group by attrition interaction. Social competency score means seemed to be significantly affected by attrition. The scores of the subject who dropped out of the study were higher than those of subject who remained. There was no significant group by attrition group interaction so the attrition of subjects with high social competency scores was much the same for both experimental and control groups.

Pinkett (1985) examined the long-term effects of preschool attendance on 226 third- graders. Information on preschool attendance was obtained from parents. Each subject was assessed on social competence, cognitive ability, reading, and math achievement. Results indicated that children who attended preschool and children who did not were not different in social and cognitive competence by third grade. Findings also indicated that children who attended half-day preschool had higher social competence and cognitive ability scores than did children who attended day care.

Lee, Brooks, Schnur and Fong (1990) did a longitudinal follow-up comparison of children attending Head Start and no preschool. Participation in generic Head Start programs was compared to both no preschool experience for children in two American cities. Covariance analysis controlled for important confounds. Children who attended Head Start, as in comparison to other preschools,

maintained educationally substantive gains in general cognitive/analytic ability, especially, when compared to children without preschool experience. Findings suggest an effect of preschool rather than of Head Start perse.

Riding and Simmons (1990) summarized a study on instructions in pre-reading skills in preschool children and its effect on the subsequent rate of reading attainment. The conditions were: (a) nursery education with computer-presented structured pre-reading instruction, (b) normal nursery activities, and (c) no formal nursery education. The groups who received pre-reading skills training learned to read more quickly in terms of the number of books in the reading scheme read. Both nursery conditions were superior in the no-nursery groups.

Lee, Brooks-Gunn and Schnur (1988) compared the outcomes of 969 children who had experienced two different pre-school environments: Head Start and some other preschool. Large, initial differences on a wide range of outcomes were found at school entry, with Head Start children lower on almost all measures. After adjusting for initial scores, Head Start children showed larger gains on measures of social and cognitive functioning compared with children in the other two groups. Thus, in Lee's study, Head Start was effective in "closing the gap" but did not succeed in doing so completely because its children began a greater level of disadvantage.

Notable in Lee's (1988) study, larger gains were made by black children in Head Start. Pre-school intervention is particularly effective for the most economically disadvantaged children. Lee reported that black children gained more than white children, even when controlling for initial levels of ability.

Hortacsu, Nuran, Uner, and Hande (1994) did a study on family background and perceived control as a predictor of academic achievement. This study investigated relationships between measures of family background, and perception of control in a sample of children. Both parental educational background and perceptions of control seemed to exert direct and indirect effect on children's grade point average.

Although studies do not suggest that all preschool programs will bring lasting benefits, they demonstrate that early education can change the course of children lives, especially those from disadvantaged backgrounds, although samples are often small. The experimental design and longitudinal follow-up studies give support to the claim that the pre-school experiences were actually beneficial and cost-effective.

Population/Sample:

The population of this study will include 65 third grade students from a Chicago Public Elementary Schooll. This school, which has a grade range from preschool to grade eighth, is located in the South Chicago Area. The students reside locally in this predominantly low socioeconomic neighborhood. The total population of the school is approximately 720. Approximately 30% of the student body is Hispanic and 70% is Afro-American.
From the 65 students in the third grade class, 30 students who had attended preschool and 30 students who had not attended preschool were selected. The school records revealed that there were 1994 and 1995 Iowa Test scores available for these students.

Each spring, the iowa Test of Basic Skills (ITBS) are administered to each student in the Chicago Public Elementary School. Two sample groups were identified from the school records of those students who had attended preschool and those who had not attended. The grade level reading and mathematics results of the Itbs administered during the spring of 1994 and 1995 school year will be used in this study. The pretest-posttest control group design was used.

The findings were tabulated in terms of means and standard deviations. Calculations were made utilizing grade equivalent scores. The t test for independent samples was utilized at the .05 difference between the mean scores.

Findings:

The samples for this study included present third grade students at a Chicago Public Elementary school located on the southeast side of Chicago, 30 students who had attended preschool and 30 students who had not attended preschool. The records indicated that 1994 Iowa Test scores in reading and mathematics were available for a pretest and 1995 scores in reading and mathematics were available for a posttest. Since the Iowa Test of Basic Skills is administered to every student in the Chicago Public Schools each spring, scores were available for the selected sample. A t test ($P<.05$) for independent samples was done for these sets of scores to determine if there was a statistically significant difference in reading and mathematics scores of the 30 students who attended preschool ant 30 students who did not attend preschool. Table 1 summarizes the statistical analyses.

Table 1

Means, Standard Deviation and t tests for the Experimental and Control Group for Reading and Mathematics Achievement Scores.

Reading

Test	Experimental	Control	t
Pretest			
M	1.14	1.72	
SD	0.9088	0.6332	2.81*
Posttest			
M	1.69	1.80	.611
SD	0.0542	0.9068	

Mathematics

Test	Experimental	Control	t
Pretest			
M	1.61	1.70	.431
SD	0.5913	0.5507	
Posttest			
M	2.30	2.17	4.80*
SD	0.5810	0.5458	

df=58

* significant at the .05 level

Table t = 2.010

The t test analysis of the Iowa Test of Basic Skills Reading indicated a score of 2.81. Examination of the 1994 mean pretest scores indicated that the experimental and control groups were significantly different at the beginning: the experimental group had grade equivalent mean score of 1.14. The control group had a grade equivalent mean score of 1.72.The findings indicate that the two groups had significantly different achievement scores at the outset.

However, the posttest scores indicated that after an additional year of schooling, the experimental group had a score of 1.69 and the control group had a score of 1.80. The t score (.611) showed no significant difference in posttest scores.

The t test analysis of the Iowa Test of Basic Skills Mathematics test scores was .431 on the pretest.The pretest scores for the experimental and control groups were not significantly differently.

The mathematic posttest scores indicated that the experimental group had a mean score of 2.30 and the control group 2.17. The t test analysis was 4.80 on the posttest scores. The mathematic posttest scores for the two groups were significantly different.

Overall, the data from this study lead to the acceptance of the null hypothesis for the posttest reading scores and the rejection of the null hypothesis for the mathematic scores.The findings indicate that preschool education had a significant (.05) impact on mathematic achievement but not reading achievement.

The results of this study indicate the need to further continue research on preschool attendance vs. no preschool and academic achievement. The study points out that gender and age may have a significant impact on achievement of students who attended preschool. Preschool also had a short-term positive effect on children's achievement. The authors pointed out that the studies were designed so differently and varied so widely that it was impossible to come to a firm conclusion on many questions in the studies. The findings in the study may have indicated different results providing the researchers had used a different instrument, random sampling and different statistics to control the extraneous variables.

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